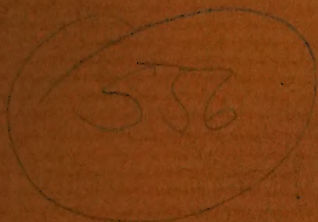
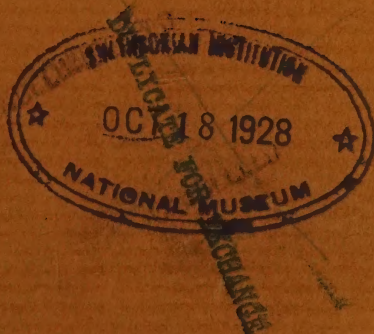


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SOUTHWEST MUSEUM PAPERS

Number Two

#2



Excavations at Casa Grande,
Arizona: by Harold S. Gladwin

NOTE: This is the second of a series of scientific reports published occasionally by the Southwest Museum. The first issue was a report of an Archæological Reconnaissance in Sonora, by Monroe Amsden, Director of Field Work.

SOUTHWEST MUSEUM PAPERS

Number Two

Excavations at Casa Grande, Arizona

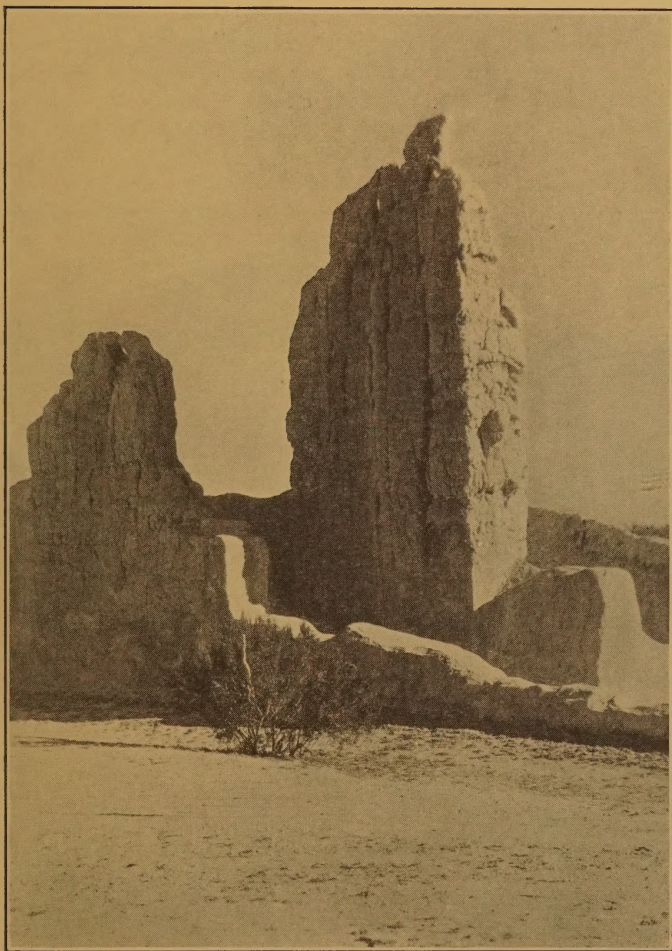
February 12 --- May 1, 1927

by Harold S. Gladwin, Research Fellow in Archaeology



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Portion of Compound "A", Casa Grande



*The "Great House" at Casa Grande in present condition, with modern roof
to prevent further weathering*

FOREWORD

The area of the ancient Pueblo civilization can be roughly defined as bounded on the west by the Colorado River, on the east by the Rio Grande, and on the north by the broken and mountainous country of Utah and Colorado. The southern boundary must remain indefinite until conditions in Mexico make it possible for archæologists to examine the remains that undoubtedly exist in the northern part of that country, but about which nothing is known other than scattered collections from the Casas Grandes ruins in northern Chihuahua.¹

That section of the Pueblo area which is confined to the United States has been divided into eight sub-cultural districts² as follows:

The Northern Peripheral: eastern Utah and eastern Nevada, with an as yet undefined border to the north and west.

The San Juan: The drainage of the San Juan River in northern Arizona and southern Utah.

The Little Colorado: The drainage of the Little Colorado River in northeastern Arizona.

The Rio Grande: The drainage of the Rio Grande River in northern and central New Mexico.

The Eastern Peripheral: An area difficult to define, lying between the Rio Grande Valley and the Great Plains to the east.

The Upper Gila: The drainage of the Gila River in southeastern Arizona and southwestern New Mexico.

The Mimbres: The drainage of the Mimbres River in southwestern New Mexico.

The Lower Gila: South-central Arizona.

Of these areas the San Juan and the Rio Grande have yielded the most important results up to the present time, both because of the greater effort expended upon them, and also because, in both regions, large ruins have been found containing the stratified evidence of many centuries of human habitation.

In the San Juan, Pueblo Bonito has afforded a span of culture beginning with a pre-Pueblo type of pottery and house construction, and leading up to the best of the classic Pueblo period.³

In the Rio Grande, Pecos stood for a thousand years or more, covering the span from about the time that Pueblo Bonito was abandoned up to 1838 A.D., when it also was forsaken.⁴

In order to make any further contribution that might shed light on the problem of human development in the Southwest, it was recognized that the Southwest Museum, in re-entering this field, should choose a site which might also show long-continued occupancy.

¹The Southwest Museum has published as Paper Number One in the present series, "Archæological Reconnaissance in Sonora", by Monroe Amsden, former Director of Field Work of the Southwest Museum.—Ed.

²Kidder — 1924.

³National Geographic Society—Pueblo Bonito Expedition, led by Nell M. Judd.

⁴Phillips Academy, Andover, Mass. Southwestern Expedition, led by A.V.Kidder.

The Little Colorado area offers few, if any, ruins that might provide such evidence, with the exception of the present day pueblos of Zuni, and the Hopi villages.

Of the Upper Gila area practically nothing is known, as little work has yet been done other than that by Dr. Walter Hough in 1901 and 1907. Ruins, while numerous, appear to be comparatively small and to have been occupied only for short periods. The same conditions seem to prevail in the Mimbres area.

From the fact that corn was introduced from Mexico, and from the great agricultural development reached in the Gila Valley, it is possible that future investigation will show that this valley, draining all of southern Arizona, may have been an important link between the Pueblo culture and the civilizations of Mexico and Central America.

In view of these considerations it was decided that the area which has been defined as the Lower Gila offered the greatest opportunities, and the advice of Mr. Frank Pinkley, Superintendent of the Southwestern National Monuments at Casa Grande, was accordingly sought in selecting the best site for actual operations.

Discussion with Mr. Pinkley convinced us that we need look no further than Casa Grande itself. Camp was established in the shadow of the ruin, and the necessary steps were taken in order to carry out the purposes of the expedition.

Briefly these purposes may be described as follows:

FIRST—To conduct stratigraphic tests in some one central locality in the hope of being able to define a sequence of culture.

SECOND—The result of these tests to be used as a criterion to be applied to smaller ruins in the immediate vicinity, and so radiating out in ever-widening circles until adjoining cultures should be tapped.

THIRD—The acquisition of material to be subordinated to the search for knowledge, since it was recognized that many museums are filled with lifeless collections about which little or nothing is known.

FOURTH—To do as little harm as possible; by which is meant that trenches and test-pits disturb a ruin but little as compared to systematic excavation in search of relics.

This opportunity is taken to express sincere appreciation and deep gratitude to Mr. and Mrs. Frank Pinkley for assistance rendered, not only in helping in the choice of the area to be worked, but also in giving freely of the benefit of their experience, with much friendly encouragement. It would have been quite impossible to achieve the results embodied in this report, without their aid.

Thanks are also due to Mr. George L. Boundey, then Assistant Custodian at Casa Grande, who has been unfailing in his helpfulness; and to many other friends whose advice has been of assistance.

Note—In order to avoid confusion the Casa Grande group of ruins will hereafter be referred to as "Casa Grande", "the ruins", "Casa Grande group", etc. When specific reference is made to the main building it will be designated as "The Great House".

Excavations at Casa Grande, Arizona

A Report by Harold S. Gladwin

CONDITION OF THE RUINS ON FEBRUARY 1, 1927

The ruins of Casa Grande are situated in Pinal County, Arizona, nine miles west of Florence. The main building, rising 30 feet or more above the floor of the desert, is a prominent land-mark in the broad flat plain through which the Gila River flows in a westerly direction, $3\frac{1}{2}$ miles north of the ruin.

This great plain is bounded along its northern border by broken, mountainous country which probably acted as a barrier in the past and served to isolate the people of the valley. Numerous small mountain ranges break the monotony of the plain, but none are high enough to add variation to the vegetation characteristic of the Great Southern Desert of Arizona. This includes the giant Sahuaro and many smaller varieties of cactus, Greasewood, Palo Verde and Mesquite; in the vicinity of the ruins there are at present only Greasewood and Mesquite, which are thought to have replanted themselves since the land, formerly under cultivation, was abandoned.

The surface of the plain is marked by a network of prehistoric irrigation ditches, many of which have been incorporated in modern systems to advantage.

The groups of ruins, which are dominated by the Great House, are divided into units which have been described as compounds,¹ each one being a cluster of houses surrounded by a wall which in some cases was ten feet high.

Within the compounds are dwellings of various types, showing a wide range of architectural technique. These features have been minutely described by Cosmos Mindeleff.² For the present, it will be enough to mention that actual construction varies from massive buildings of four stories, with walls four feet thick at the base, to single-room houses, the walls of which are only a few inches thick, laid up on a framework of piñon poles crossed by arrow-weed or other small rods, perfect examples of reinforced construction.

These architectural types, while long recognized, have never been linked into a definite chronological sequence, since both sorts of construction have been found in each of the compounds excavated. This sequence must be determined wholly by excavation, the former occupants having left no descendants whose identity can be established. The general area has been occupied during the Historic Period by the Pima Indians, but their culture shows no analogies with that of the builders of the compounds, and the term Hohokam, "that which has perished," is used by the Pimas to designate the race that occupied

¹Fewkes, 1912.

²Mindeleff, 1896-1897.

the pueblos that are now rounded heaps of ruins in the Salt and Gila River Valleys.³

The condition of Casa Grande in February 1927, can best be described by referring to a monograph by Mrs. Edna Townsley Pinkley. The views of Mr. and Mrs. Pinkley, quoted below, are the result of twenty-three years' intimate association with the ruin, and sorting and selecting the ideas and theories of the many thousands of persons who have visited Casa Grande, amongst whom may be included many of the leading archaeologists of the world:

"The Casa Grande itself is a group of ruined walls, with the four story walls of the main building, or 'big house' dominating the scene. It has unfortunately been necessary to cover this building with a roof, which spoils the artistic effect, but which is very important for the preservation of the walls for future generations. This building is about forty by sixty feet and the walls stand about forty feet above the desert level. In this Casa Grande are eleven rooms (five on each of two floors and one on the highest story), with an additional five rooms on the ground floor which were filled in at the time of building to form an artificial terrace. The one room on the top floor must have been considered very important as it was gained at a sacrifice of five rooms on the ground floor. Its use was primarily as a watch tower, as from the ramparts above it a watchman could see as far as the vision would carry, but all the rooms were probably used as dwelling rooms. Around the main building are the ruins of many other rooms and groups of rooms, the whole surrounded by an outer wall, making a walled village, or compound, 216 by 420 feet. Most of these outlying rooms are one story in height, but several are two stories, and the group in the southwest corner is three stories high.

"This is the main group called Compound A. Scattered within the area of the Monument (480 acres) are several other compounds which have been excavated, and an unknown number of older ones, unexcavated, some of which are definitely located, and probably there are even more as yet undiscovered.

"Compound B, the second in importance, is about 900 feet north of Compound A, and is 165 x 300 feet. This compound presents a somewhat different appearance from A, as here the walls were not filled in to make an artificial terrace, but the terrace was built first, and upon it were reared houses of a more flimsy type. Surrounding these terraces, of which there were two, are rooms as in Compound A, some few of the solid type of wall used commonly in A, but more of a re-inforced type which will be considered later. The other compounds are older, more disintegrated, and consequently more interesting to the archaeologist than to the layman. Exception must be taken in the case of the ruin east of the Casa Grande, which is called, for no obvi-

³Russell, 1908.

ous reason, "Clan House." This is an interesting building with indications of a surrounding wall. In this house there was a series of rooms surrounding an open plaza, and in the room at the end of the plaza which has two doors connecting, is the remains of a chair, throne or altar, around which are many interesting traditions

"The walls of the Casa Grande are four feet six inches thick at the base and were made without the use of any forms whatever. They were instead, piled up. The caliche of which they are made was puddled with water to a stiff mud, about the consistency which any child would tell you, is the proper stage for mud pies. This was carried in baskets and piled along the indicated lines. By the time one course was laid and patted into shape, it would have dried and become stiff enough for the next course, and thus, there is every evidence to believe, the walls were laid. This theory is strengthened by cross sections of the walls which show that the tops of the courses were curved and much higher in the centers than the sides. Just at the top of every story triangular layers were laid at the sides to straighten the tops of the walls before the roof beams were laid.

"The walls were plastered with caliche rubbed through a sieve and plastered on by hand, making a hard, smooth, shiny finish which still endures and has become of a reddish hue with age. There are no windows and only low doors. The doors are small but this does not prove a small people, but rather meant protection from the elements and from enemies. Some rooms had no doors, but must have been entered from the roofs. There were no openings in the surrounding walls which were, in A, eleven feet high."

Camp was established on February 12, 1927, in close proximity to the government buildings, and, after a preliminary inspection of the group of ruins, it was decided to confine our efforts to the rubbish heaps which are an essential part of each of the Casa Grande compounds, and which afford opportunity for intensive investigation complying in all respects with the purposes of the Expedition already outlined.

The rubbish mounds, as a general rule, are situated roughly northeast, east and southeast of the compounds with which they are associated, and are supposed to consist of litter and rubbish that was swept up, carried off and dumped on the mound by the inhabitants of the settlements. If this supposition be correct, it is not easy to explain the highly developed desire for cleanliness and order to which these mounds are a monument, since each mound contains many thousands of tons of earth, ash, etc. No other explanation, however, has been offered except by Cushing, who has referred to them as pyral mounds, where bodies were burned during the era when cremation was practised.

OPERATION NO. 1

We chose for our opening work, the rubbish mound due east of Compound B, designated in this report as Operation No. 1. This mound was partly excavated by Dr. Fewkes in 1907 and the area of his excavation can still be traced; we therefore sank our first test-pit slightly to the north, and on the extreme eastern edge of the mound. It required only a short time to show that we were working in undisturbed ground, as the tilt of the original strata of ash and gravel was clearly apparent.

A vertical pit ten feet long, running in a northerly and southerly direction, and two feet wide, was sunk into the mound to a depth of fourteen feet, strata being removed in six-inch layers. No artifacts were found other than broken pieces of pottery. All sherds were saved and sorted, and the following facts finally became evident:

FIRST—that we were dealing with four broad types of pottery: plain cooking ware, red-ware, a ware with red decoration on a buff background, and a polychrome ware with a black and white decoration on a red or brown ground.

SECOND—The plain, the red, and the red-on-buff wares were present at all levels.

THIRD—The polychrome ware was only found in the six upper layers.



The Expedition Camp

(Wm. M. Clarke Photo)

FOURTH—The tilt of the strata of formation was such that it became immediately apparent that it would be difficult, if not impossible, to confirm the results of this test by sinking pits in other parts of the mound.

In order to show the method of formation of the mound from its inception, a trench was run at right angles in an easterly and westerly direction. After cutting into the mound for approximately twenty feet, it was found that the strata all dipped sharply from west to east, and it was not until the trench had been cut right through the mound to the desert level, that we were able to determine that the original core had been started at the extreme western edge, and that all subsequent refuse had been dumped to the east. Since the prevailing winds at Casa Grande are from the southwest, it is probable that this practice was followed in order to prevent ash and dust from blowing back into the compound. It was therefore obvious that vertical pits could not serve to demonstrate the sequence of pottery types that was being sought, since each such pit would touch only a few strata. Horizontal tests were therefore resorted to as the best method of tapping all horizons.

In making the actual test of this mound a core was excavated from the desert level on the west side, at the side of the trench, and through to desert level on the east side, rising slightly in the middle of the mound in order to avoid the confusion of strata when rubbish was dumped on the flat surface of the ground. This core was twelve inches deep and twelve inches wide, and was removed in five-foot sections, the sherd content averaging about a hundred sherds to each section. This method was followed in order to touch every cultural horizon in the mound in the order in which it was laid down. (See figure No. 1, page 28.)

Analysis of the sherd content of the mound shows:

FIRST—The nucleus of the mound was laid down during a period before the introduction of polychrome ware.

SECOND—Ceramic wares in the order of their percentages are as follows:

Plain ware .....	.6038
Red ware (smoke-blackened, burnished) .....	.1541
Red-on-buff .....	.1225
Red ware (smoke-blackened, dull) .....	.1190
Polychrome .....	.0006
	<hr/>
	1.0000

THIRD—Of the red-on-buff sherds:

- 89 showed no decoration; bottoms of ollas, bowls, etc.
- 97 showed outside decoration; ollas.
- 4 showed inside decoration; bowls.
- 4 showed flaring rims; (See figure No. 2, page 28.)
- 1 showed re-turned rim; (See figure No. 3, page 28.)
- 1 showed interior smoke-blackened and burnished.

From these figures the following deductions may be made:¹

FIRST—Sherds of bowls of red-on-buff ware with interior decoration were scarce.

SECOND—Bowls during this period were chiefly of red ware, the interiors being smoke-blackened and burnished.

THIRD—Ollas were made of red ware, the interiors being smoke-blackened and dull, and of red-on-buff, the necks of which were chiefly vertical. (See figure No. 4, page 28.)²

FOURTH—Three were found in the eastern half of this mound, black-on-red sherds with designs typical of Little Colorado ware, and the smoke-blackened, burnished corrugated ware of the same region with decoration in white on the outside.

OPERATION NO. 2

The rubbish mound excavated during Operation No. 2 lies due east of the main Casa Grande ruin in Compound A. The mound showed a heavy content of ash, but the analysis of potsherds added little, if anything, to our knowledge of the site, other than to show that polychrome ware was present in the east half of the mound. The same method of taking the test was followed as in Operation No. 1.

An analysis of the sherd content of the mound shows:

FIRST—As in operation No. 1, the mound was begun before the introduction of polychrome ware.

SECOND—Ceramic wares in the order of their frequency are as follows:

Plain ware .....	.7000
Red ware (smoke-blackened, burnished) .....	.1203
Red ware (smoke-blackened, dull) .....	.1204
Red-on-buff .....	.0540
Polychrome .....	.0033
Intrusive .....	.0020

1.0000

¹Early efforts to create distinctions in plain ware resulted in failure, and the problem has been left to the future. In this report plain ware is ignored except in tables of percentages.

²A distinction has been made between sherds, smoke-blackened-dull, and those which are burnished. This distinction is clearly apparent in whole pieces but it is difficult to maintain a standard for judging sherds, and the figures given for these two classes must be looked upon as approximate.

Third—Of the red-on-buff sherds:

- 35 showed no decoration; bottoms of ollas, bowls, etc.
- 44 showed outside decoration; ollas.
- 1 showed inside decoration; bowl.
- 1 showed inside and outside decoration; bowl.
- 2 showed interior smoke-blackened and burnished.

SUMMARY—Compared with operation No. 1:

Of the undecorated types, plain ware shows an increase at the expense of smoke-blackened red ware, both burnished and dull.

Of the decorated types, polychrome increases as red-on-buff drops off.

Intrusive sherds also show an increase, the types being black-on-red, characteristic of Little Colorado culture.

OPERATION NO. 3

Mound situated South of No. 2 and directly in rear of the Expedition camp. It was trenched, and tests were taken in the same manner as in No. 1 and No. 2. Polychrome ware was found to be present in all sections from west to east, but with a marked increase in the last eastern sections.

Analysis of the sherd content of the mound shows:

FIRST—Polychrome ware was already in vogue when the mound was begun.

SECOND—Ceramic wares in the order of their frequency are as follows:

Plain ware .....	.7443
Red ware (smoke-blackened, burnished) .....	.1421
Red ware (smoke-blackened, dull) .....	.0580
Red-on-buff .....	.0352
Polychrome .....	.0195
Intrusive .....	.0009
	<hr/>
	1.0000

THIRD—Of the red-on-buff sherds:

- 12 showed no decoration; bottoms of ollas, bowls, etc.
- 50 showed outside decoration; ollas.
- 2 showed inside decoration; bowls.
- 6 showed inside and outside decoration; bowls.
- 3 showed interior smoke-blackened and burnished.

SUMMARY—Compared with operations No. 1 and No. 2.

Of the undecorated wares, plain shows a further increase, with smoke-blackened, burnished red ware also increasing at the expense of smoke-blackened, dull red ware.

Of the decorated types red-on-buff again shows a decline as polychrome increases.

Intrusive sherds were found of the black-on-red pottery typical of the wares from the Little Colorado area from the vicinity of St. Johns. There were also a few sherds of yellow ware, typical of Early Hopi culture of the period immediately preceding the Spanish invasion.

OPERATION NO. 4

This mound is situated about one mile east of the main Casa Grande ruin, just beyond the tracks of the Southern Pacific Railroad and outside the boundary of the National Monument.

Three rubbish mounds are clearly defined, of which that excavated as Operation No. 4 is the largest, but persistent search has failed to reveal any trace of the walls of the houses with which these mounds must, at one time, have been associated.

A trench which was cut through the mound from west to east gave no indication of its formation; numerous short strata of ash and charcoal inclined at different angles and no definite core was found.

A vertical pit, eight feet long and two feet wide, was sunk in the



Red-on-buff bowl, decorated with small repeated elements

(Wm. M. Clarke Photo)

centre of the mound and six-inch layers were removed. Four other pits were sunk, north, south, east, and west, at distances of thirty feet from the centre, to find out if any variation existed in an east-west or north-south direction sufficient to warrant a horizontal test. No such variation was found.

Analysis of the sherd content of the mound shows:

FIRST—No trace of polychrome ware was found in the mound.

SECOND—Ceramic wares in the order of their frequency are as follows:

	Center	N.	S.	E.	W.
Plain ware	6140	.5863	.6262	.6352	.6870
Red-ware (smoked-blackened, dull)	1044	.0625	.1054	.0718	.0600
Red-on-buff	2816	.3512	.2684	.2930	.2530
Red-ware (smoke-blackened, burnished)	—	—	—	—	—
Polychrome	—	—	—	—	—
	1.0000	1.0000	1.0000	1.0000	1.0000

THIRD—Of the red-on-buff sherds:

540 showed no decoration; bottoms of ollas, bowls, etc.

493 showed outside decoration; ollas.

312 showed inside decoration; bowls.

206 were from bowls with flaring rims. See figure No. 2.

13 were from ollas with sharply re-turned rims. See figure No. 3.

35 showed designs consisting of small repeated elements.

SUMMARY—This operation probably contains more significance than any other single operation, since it holds promise of affording valuable information in regard to the sequence of red-on-buff types both as to shape and design. The following points have been selected as noteworthy:

FIRST—The appearance of sherds of bowls with inside decoration consisting of small, repeated elements of design, dots, dashes and many small markings which roughly suggest the letters of our alphabet.

SECOND—Flaring rims of bowls the shape of inverted bells, decorated only on the inside with small elements and broad solid designs.

THIRD—Rims of ollas were found to be sharply re-turned; sherds with outside decoration were probably fragments of these ollas as no bowl-rims were found showing outside decoration.

FOURTH—A few sherds showed a lightly incised line-decoration.

FIFTH—Sherds were present from vessels of red-ware with dull smoke-blackened interiors, probably small ollas. No smoke-blackened burnished ware was found.

In association with the above sherds of local wares there were present fragments of the black-on-white pottery of the northern cultures and also a few pieces of the rough gray heavily corrugated ware of the Little Colorado area.

It should also be noted that, in this mound, no lumps of wall material (caliche) were found.

OPERATION NO. 5

This covers the small ruin located at Adamsville, five miles east of Casa Grande on the road to Florence. Of the three ruins at this site, this operation refers only to the central low mound lying east of the main ruin of Adamsville.

The type of culture closely parallels that of Operation No. 1 in compound B at Casa Grande, and the two settlements were probably allied and contemporaneous. The rubbish mounds (see Operation No. 6) indicate a long period of red-on-buff occupancy with a thin capping of polychrome during the final stages.

The ruin has suffered greatly at the hands of vandals, probably Apache, floors being covered with a thick layer of sherds, apparently the remains of many whole pieces that were crushed when the buildings were demolished. In confirmation of the analysis of the sherd content of the rubbish mound (see operation No. 6), a few underlying rooms were found to contain, in decorated ware, only red-on-buff sherds, and in connection therewith the wall construction was exclusively of the reinforced type. These rooms were filled with rubbish, sand, ash, sherds, etc., but above them other rooms had been built, the walls of which were of the massive type of construction, the sherds in association being the same as in the lower rooms, but with the addition of polychrome ware.

Cremation burials in red-on-buff and red-ware ollas were found southwest of the rubbish mound designated as operation No. 6; a few polychrome bowls and vases were found in the rooms of the ruin but not in association with burials.

OPERATION NO. 6

The rubbish mound formed by the occupants of the building excavated during Operation No. 5, lies about 100 yards east of the ruin. A horizontal test was made similar to those in Operations No. 1, No. 2, and No. 3, and in general No. 6 can be said to represent about the same stage of culture as Operation No. 1; in other words, a red-on-buff era followed by a short polychrome period.

Analysis of the sherd content of the mound:

FIRST—As in Operations No. 1 and No. 2 the mound was begun before the introduction of polychrome ware.

SECOND—Ceramic wares in the order of their frequency are as follows:

Plain ware .....	.6547
Red ware (smoke-blackened, burnished).....	.1706
Red ware (smoke-blackened, dull) .....	.1000
Red-on-buff .....	.0628
Polychrome .....	.0119
	<hr/>
	1.0000

THIRD—Of the red-on-buff sherds:

53 showed no decorations; bottoms of ollas, bowls, etc.

76 showed outside decoration; ollas.

5 showed inside decoration; bowls.

3 showed inside and outside decoration; bowls.

SUMMARY—Comparison of these figures with those of Operation No. 1 will show that this mound represents the same type of culture.

OPERATION NO. 7

To the south of Operation No. 1 there is a flat piece of ground where, some years ago, Mr. George L. Boundey, former Assistant Custodian at Casa Grande, discovered quantities of burnt turquoise beads. It has been supposed that these beads were burned during the period when cremation was practised. An effort to recover a substantial amount of these beads resulted in the finding of the burial ground of Compound B, twenty-seven cremation burials coming to light in this one area.

The ollas containing the cremated bones were usually small, the pottery being either red ware with occasional dull smoke-blackened interiors, or red-on-buff ware with vertical necks and well executed geometric designs. No polychrome ware was found in association with cremations. The ollas were resting on a solid bed of caliche about fifteen inches below the surface of the ground.

Two earth-burials unaccompanied by any funeral furniture, were also found, the bodies lying prone, with heads to the east.

OPERATION NO. 8

Situated about half-way between Mounds Nos. 1 and 4. The desert in this locality is perfectly flat except for three low rubbish mounds. Slightly to the west of the mounds a thin straight line of grass, about four feet long, was found after the spring rains. Ex-

cavation revealed that this marked, not the wall of a house as had been supposed, but the wall of a new compound. Unlike all other compounds in the Casa Grande group, the axis lies in an easterly and westerly direction, the area being roughly 200 by 100 feet.

It has not yet been possible to carry on any extensive excavation in this compound, but up to the present the walls of houses within the compound, which have been uncovered, have all been of the reinforced type of construction. One small bird-shaped vessel of red ware and one plain olla are the only pieces of pottery found.

OPERATION NO. 9

A small ruin about one hundred yards north of Operation No. 5 and probably a part of the same settlement, although it does not seem to have been built during the earlier stages, as the walls are of the massive type of construction and the sherds do not show any pure red-on-buff occupancy.

Architecturally the chief point of interest centres in what appears to be a bonded corner of the standing wall, a detail of construction rarely found in American aboriginal structures.

The remains of a woman were found in one of the rooms of this ruin, prone, with head to the south, the arms folded over the breast; the skeleton was resting on partly charred logs covering the floor in the centre of the room, but whether the logs were there by chance or intention is not known. No mortuary offerings were found.

OPERATION NO. 10

The rubbish mound southeast of the compound designated as No. 8. This mound was the smallest of the three trash heaps associated with the new compound. It has been badly disturbed by badgers and no sherd test was taken. No polychrome sherds were found either on the surface or in excavating the trench.

OPERATION NO. 11

Efforts to find a burial ground south or west of Mound No. 10 disclosed several plain sherds and fragments of a bowl which may have represented a cremation burial. The ground has been badly disturbed, however, and the evidence is therefore uncertain.

OPERATION NO. 12

The central and largest mound connected with the new compound. The mound has been badly dug up by badgers and no effort was made to effect a horizontal test. A vertical pit was sunk in the

middle of the mound to ascertain the types which might be present, rather than in the hope of finding superimposed cultures.

Analysis of the sherd content of the mound shows:

FIRST—No trace of polychrome ware.

SECOND—Ceramic wares in the order of their frequency are as follows:

Plain ware .....	.6762
Red-ware (smoke-blackened, dull) .....	.1300
Red-on-buff .....	.1180
Red-ware (smoke-blackened, burnished) .....	.0758
	<hr/>
	1.0000

THIRD—Of the red-on-buff sherds:

67 showed no decoration; bottoms of ollas, bowls, etc.

115 showed outside decoration; ollas.

87 showed inside decoration; bowls.

13 showed small repeated elements in design.

5 showed flaring bowl-rims.

6 showed vertical olla necks.

SUMMARY—The sherds in this mound disclosed that bowls with flaring rims and inside decoration, such as were found in Operation No. 4 were present in association with ollas having vertical necks such as were characteristic in Operations No. 1, 2 and 3. The number of sherds showing inside decoration more nearly approaches the number showing outside decoration than in any other mound and there is reason to suppose that this operation represents an intermediate stage between the period represented by No. 4 and that of No. 1, No. 2 and No. 3.

No polychrome ware was discovered; a few red-on-buff sherds with lightly incised lines were found, also one sherd of corrugated ware with black-on-white inside decoration.

OPERATION NO. 13

The discovery of burnt turquoise beads south of Operation No. 12 led to trenching, which disclosed the burial ground at this site. Several small urns containing bones of cremations were found, some being of red ware, others of red-on-buff ware with well executed geometric designs of simple pattern.

CONCLUSIONS

I

Since our efforts were directed primarily toward the establishment of a pottery sequence, an analysis of these results is presented before the introduction of other factors.

POTTERY—Four distinct wares are to be found:

1—*Plain*; usually brown in colour, unslipped; tempering material, mica, sand or gravel, ranging from fine to coarse; vessels chiefly ollas; used for cooking and water storage, some having been found holding as much as 25 gallons.

As already admitted, all efforts to distinguish types or consistent variations in plain ware resulted in failure; it appears to be the case that from the earliest times at Casa Grande the technique of making vessels of plain ware has undergone no appreciable change as regards paste, tempering material, vessel shapes, rims or necks.

2—*Red-Ware*. Generally similar to the red ware to be found throughout the Southwest but probably more prevalent in the Gila Valley than elsewhere. It occurs in three types, plain, smoke-blackened dull, and smoke-blackened burnished. Judging from Operations No. 1 and No. 4, plain red vessels are to be found at all periods, chiefly in the form of small ollas which were frequently used to hold the ashes of cremation burials.

The sequence of red-ware will be more easily determined by the application of other criteria than by an attempt to analyze the types *per se*; to distinguish between the dull and the burnished sherds is often very difficult and is therefore uncertain as a diagnostic.

3—*Polychrome*: Black and white decoration on a red or brown base; a distinct technique in marked contrast to other Southwestern pottery types, with the exception of the Chihuahua polychrome with which it is closely allied.

A brief investigation (Operation No. 1) gave clear evidence that polychrome ware was a late arrival at Casa Grande and little effort was made to differentiate the types. These seem to fall into three groups:

A—Two colour decoration: Black and white decoration on a red or brown base; chiefly bowls with decoration only on the inside.

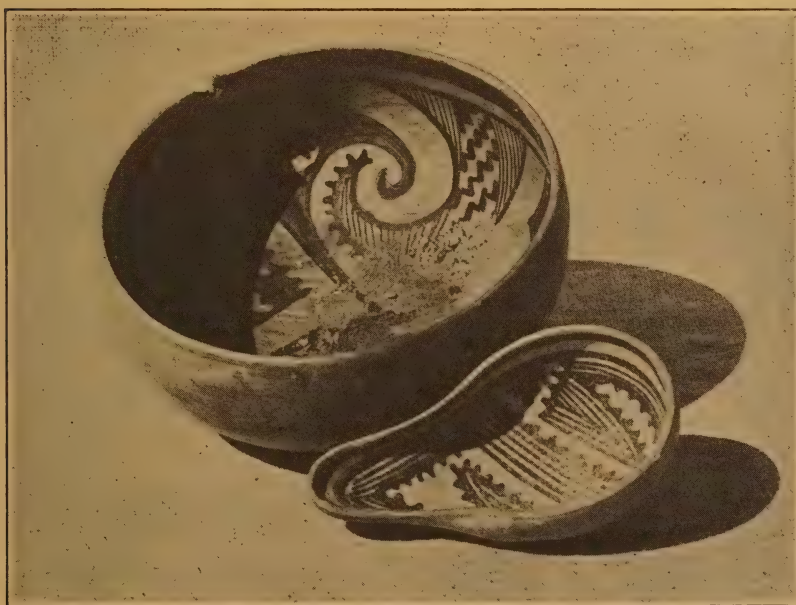
B—Three colour decoration: Black, white and red decoration on a red or brown base; chiefly bowls with decoration only on the inside.

C—Two or three colour decoration: Bowls with inside and outside decoration.

Other vessel shapes are vases, ladles, bird-effigies; ollas, when made, are small, rarely approaching the size of the plain or red-on-buff ollas.

4—Red-on-buff; buff slip, not polished*, on a paste which varies in colour from grey through tan to pink; tempering material usually fine, contains mica. The paint used in decoration ranges from a thin mustard colour to a deep maroon and will probably prove to be significant as a standard of classification under intelligent treatment.

The span of decoration also offers unusual opportunities to the student of aboriginal design, as the early stages, which are characterized by small repeated elements, may be regarded as elementary,



Polychrome Dipper and Bowl

(Wm. M. Clarke Photo)

whereas the late stages compare favorably with the best of geometric decoration in other cultures, particularly in negative design.

II

Red-on-buff ware has been selected as offering greater possibilities of interpretation and classification than any other; although it is probable that the earliest, and possibly the latest, stages are only partly represented at Casa Grande. The following sequence is suggested, based partly on theory but also covering the data which have been disclosed by the work of the Expedition:

*Polishing over the slip and decoration was practiced during the late phase when bowl interiors were smoke-blackened and burnished.

It is reasonable to suppose that, following upon the development in the Southwest of the Basketmaker culture, a uniform culture persisted for a considerable period. How widespread this may have been, or how long it lasted, is not now under discussion; it is enough to say that there were subsequent phases such as post-Basketmaker, pre-Pueblo or Transitional, which were to some extent, characterized by so-called Pit-house culture. In all probability the original parent culture had already begun to split into numerous sub-cultures under the varying conditions of environment, since it is becoming increasingly apparent that even the Pit-house culture was not everywhere the same.

However this may be, the first indications of human occupancy in the Gila Valley are presumably to be found in pit-houses. One such site has been discovered on the Santa Cruz river by Dr. Cummings and several others have been mentioned as occurring among the ruins at Casa Grande.

The writer is not sufficiently familiar with pit-houses to be able to comment intelligently on the circular depressions at Casa Grande, but taking into consideration the fact that the ruins are $3\frac{1}{2}$ miles south of the Gila River the question presents itself whether it is reasonable to suppose that, in early days, an irrigation system was already in use without which it would have been difficult for the pit-dwellers to live at such a distance from the river; and furthermore, granted that this was the case, what the influence could have been which caused them to exercise such a choice. It is quite possible, however, that typical pit-house culture will be found on the broad benches near the river.

The earliest stage of culture, judging in terms of pottery, is to be found in Operation No. 4 where red-on-buff ware is found in the form of bowls with wide flaring rims (Figure No. 2), and ollas with sharply re-turned rims (Figure No. 3). Decoration was applied with a heavy maroon paint on an unpolished buff slip. In the case of bowls the designs consisted of small repeated elements and of broad solid designs, with decoration only on the inside of the vessel, lightly incised lines occasionally having been drawn on the outside. In the case of ollas, the designs are usually broad and solid, or else rather crude geometric figures mixed with repeated dots, dashes, squiggles, etc. In both cases the small elements are occasionally found to have been developed into little bugs, lizards, birds, etc., chasing each other in endless procession around the vessel.

While this type of decoration is found at Casa Grande, it is not common, and I feel sure that it did not originate there. The discovery of a pure small element site would help to settle the question. If my deductions are correct, such a site should antedate Operation No. 4.

The type of house structure at this period is not known as no

trace of walls or foundations have been found. It is my guess, however, that the people responsible for Mound No. 4, lived in small clusters of one-room houses, possibly with wattle walls such as the Pima use today, possibly already using the reinforced piñon and caliche walls which later were adopted as standard construction. Whether compound walls were built at this time is not known, but I should be inclined to doubt it.

No burials have as yet been found in Operation No. 4, but it is probable that cremation was practised, as this seems to have been customary during the red-on-buff era.

The next stage is more clearly marked through the discovery of the new compound, Operation No. 8; here the flaring rimmed bowls are still found, in reduced numbers, together with ollas with returned rims, the decoration in both cases being identical with the corresponding types in Operation No. 4. In addition, however, there are small red-on-buff ollas with vertical necks, (Figure 4), the decoration of which is carried out with an anaemic mustard-coloured paint which almost immediately dissolves when the vessel is washed in a solution of muriatic acid. Designs are purely geometric, the combination with small elements having been dropped. It is unfortunate that we were unable to obtain any stratified evidence but the mounds are small and have been churned up by badgers for many hundreds of years.

Before beginning excavations at this site the ground was perfectly level as was the case in Operation No. 4, and it was with great surprise that we followed walls for 200 feet in a straight line under a surface which gave no clew. We were unable to complete the excavations within the compound walls, but present indications point to a settlement of one-room houses, of reinforced construction, clustering within a compound wall, 200 feet by 100 feet of massive construction.

Cremation burials were found, the remains being placed in urns of red-ware and small red-on-buff ollas with vertical necks, as described above.

New links will probably be found to connect No. 8 with the main Casa Grande group of ruins, since the population must have greatly increased over that of the early days and a tendency was developing of drawing in on a common centre. In the meantime, however, the connection is clear between No. 8 and Operation No. 1, the early stages of which show the culture to have been analogous to that of No. 8.

It is not until the middle and late stages of the formation of Mound No. 1 that polychrome ware makes its first appearance on the local stage, although when it does appear, it arrives as a fully developed technique and shows no introductory stages.



Compound "B" looking North

(Wm. M. Clarke Photo)

Mound No. 1 is possibly the largest of any of the rubbish mounds in the Casa Grande group, and is here taken as best representing the change in culture over a long period of time. The changes in pottery technique are listed in the order of their occurrence from west to east, (See Figure 1).

1. Red-on-buff bowls with flaring rims are practically absent.
2. Red-on-buff sherds showing interior decoration are practically absent.
3. Sherds of red-ware with smoke-blackened, burnished interior first appear in the west end of the trench.
4. Red-ware, smoke-blackened, burnished, increases as red-ware, smoke-blackened, dull, declines. This is also true in Mounds No. 2, and No. 3.
5. Plain-ware shows a gradual increase through Mounds No. 1, 2 and 3.
6. From the time of its first appearance, polychrome ware shows a steady increase.
7. With the advent of polychrome, red-on-buff shows a steady decline.
8. Soon after the advent of polychrome, a new technique was developed in red-on-buff with decoration on both the inside and outside of bowls. The bowl interiors are smoked to a slaty grey upon which the design, usually a band, is drawn. The paint is again heavy and maroon in color, as in the early period at No. 4.
9. The last stages at Casa Grande are marked by a new and entirely different development of red-on-buff ware. Bowl interiors are smoked to a rich and glossy black, and both the inside and outside of the vessel are burnished. Decoration is applied with heavy maroon paint but the designs are unlike any of those which formerly were used and consist largely of maze patterns. This phase of red-on-buff overlaps with that described above as having inside and outside decoration, both types are contemporaneous with polychrome and I am inclined to believe that their origin is to be sought outside of Casa Grande.
10. Intrusive sherds at Casa Grande tend to confirm, in a general way, the broad outlines of chronology which have been suggested. In Mound No. 4 there were found black-on-white sherds of the type which has been described as proto-Kayenta; also a few pieces of the corrugated wares typical of early northern culture. In Mound No. 1, there were found sherds of black-on-red and also fine corrugated ware, smoke-blackened and burnished, with white outside decoration, both of which types are plentiful in the region about St. Johns in the Little Colorado area.

In Mound No. 2, which is regarded as being a little later than No. 1, there were found sherds of the yellow ware with brown decoration which is characteristic of Hopi culture of the period immediately preceding the Spanish invasion.

In addition to the changes in pottery technique which have been enumerated, several other important cultural changes took place during the formation of Mound No. 1, foremost among which are the following:

1. The use of terraces, as in Compound B, upon which houses of reinforced construction were built.

Later, in building the Great House, the entire first floor was filled with earth which was carried in and it has been suggested that the purpose was to give a solid base in order to support the unusual height of the building (see page 8). This may be correct but, as Mrs. Pinkley implies, the tremendous labor of filling in this floor was hardly justified by the meagre advantage of being able to add one room as a fourth story. The flood conditions which exist today in the southern Mississippi Valley have suggested the idea that the mounds of that region were formed to meet the recurring menace of floods. If we consider the architectural peculiarities of Casa Grande with this factor in mind, rather than to attempt to explain them as purely defensive, the conditions will appear to be more reasonable. The need for defense by the inhabitants of Casa Grande has possibly been over-emphasized, since it would seem that their chief defense must have lain in their isolated situation, rather than in artificial barriers. If they had been subjected to the persistent persecution which these earth-works would suggest, had they been designed for defense, the colony would quickly have succumbed as nothing could be simpler, or more effective, than to make a hole in the side of the irrigation ditch upon which the settlement depended for its water. It is possible that even the compound walls were built as much for flood protection as for defense.

The question will at once be asked, is it known that floods have occurred at Casa Grande?

The obliteration of house sites and compound walls which has already been referred to in Operation No. 4 and No. 8, gives evidence of a levelling process which must have exercised great power in the past; the bases of all standing walls in the area also show the effects of erosion (see also Mindeleff)*. In recent years the museum at the Casa Grande National Monument was seriously damaged by being flooded as a result of heavy rains, and, no doubt, other instances could be cited.

When one stops to realize the magnitude of the disaster of a flood to a people entirely dependent upon a reserve of stored grain,

*Mindeleff 1896—p. 300.

no precaution seems too great to take, so that the idea which prompted the building of the Great House was perhaps one of adequate storage protection, rather than of building a fortress, as thought by Bandelier, or a temple, as suggested by Cushing and Fewkes. It is true that there are few, if any, rooms at Casa Grande which can positively be looked upon as ceremonial, but the building of a temple would have been an entirely new departure for any branch of the Pueblo people and it would also have been unlike them to have dropped such an institution when once it had been launched.

2. It was during the period of Mound No. 1 that the reinforced type of wall gave way to massive construction in which caliche was laid in horizontal courses. It has frequently been stated that boxes or forms were used into which the caliche was poured and allowed to set, that this was the method which was employed in making the walls of the Great House, but no evidence has been found to support this statement. The walls of the Great House are over four feet thick, and in order to hold the sides of a form together when such a mass was tamped in place, it would have been necessary to use cross ties to prevent the sides from spreading. It would have been almost impossible to remove such ties after the caliche had hardened sufficiently for the forms to be moved, and minute inspection has failed to give any sign of cross ties or of the holes which would have remained had they been removed.

3. A change of great significance took place during this same period when inhumation replaced cremation as a burial custom. All the cremations found at Casa Grande, in Operations No. 6, No. 7 and No. 13, were contained in urns of either red-ware or red-on-buff. Very few inhumations were found, and while these were unaccompanied by mortuary offerings, they were either buried in rooms of the polychrome period, or polychrome sherds were found in association.

This gives rise to the thought that too many changes took place at this time to be accounted for by normal progress and the suggestion is offered that the advent of polychrome ware indicates a successful invasion which was followed by sweeping changes in pottery, architecture and burial customs.

Figure 1
CROSS SECTION
OPERATION NO. 1. CUT 2. SOUTH FACE.



Figure 2
Red on Buff
Inverted Bell Shaped Bowl
Flaring Rim

Figure 3
Red on Buff Olla
Neck Sharply Returned

Figure 4
Red on Buff Olla
Vertical Neck

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Amulet of pink shell and turquoise mosaic, thunderbird design.

From Casa Grande ruins.

Geo. L. Boundey

(Photo, Copyright)

